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A comparison is made between the teaching machine and horizontal and vertical text formats. A teaching machine presents an ordered sequence of instruction to the learner, one frame at a time. After responding to a stimulus frame, the learner's answer is immediately confirmed or corrected. The learner proceeds to the next frame and is prevented from changing his previous answers or going back in the program. In a horizontal programed text, succeeding frames appear on alternate pages. Answers are written either in the booklet or on separate answer sheets. By turning the page, the learner receives the correct response with the next stimulus frame. Much page turning is required.

Vertical programed texts are read from the top of the page to the bottom. A mask or slider is used. The learner exposes one frame at a time, together with the answer to the preceding frame, by moving the slider down the page. As each new frame is exposed, the learner writes his answer either in the book or on a separate answer sheet. Little page turning is required.

Seventy-seven 8th graders from Hanover, N.H., with IQ's ranging from 73-142 (118 mean) were assigned to different modes of presentation. The 65-frame program used was designed to teach the difference between numbers and numerals. It was found that intermode differences in learning were not statistically significant. Subjects using the programed texts completed the program in less time than did subjects who used the machines. It was recommended that the interaction between IQ and presentation mode be studied more closely and that, except for programs consisting mainly of copying frames, the vertical-programed text format be used.

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A Comparison of Three Modes of Presenting a Programed Instruction Sequence

by

Lewis D. Eigen, Robert T. Filep,

Leo S. Goldstein, and Bruce W. Angalet

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A Comparison of Three Modes of Presenting a Programed Instruction Sequence

by

Lewis D. Eigen, Robert T. Filep,
Leo S. Goldstein, and Bruce W. Angalet
The Center for Programed Instruction, Inc.[1]

Comparisons between teaching machines and programed texts as presentation modes have been made by Eigen and Komoski (1960), Holt and Hammock (1961), Roe et al (1960), and Silverman and Alter (1961). In each of these studies the machine was compared either to a horizontal programed text or to a vertical programed text. This study compares the machine with both the horizontal and vertical text formats.

A teaching machine presents an ordered sequence of instruction to the learner one frame at a time. After responding to a stimulus frame, the learner's answer is immediately confirmed or corrected. The learner then proceeds to the next frame; he is prevented from changing his previous answers or going back in the program.

In a horizontal programed text, succeeding frames appear on alternate pages. The learner writes his answer to the frame either in the program booklet or on a separate answer sheet. He then turns the page, and the correct response is revealed along with the next stimulus frame. A horizontal text is read from the front of the book to the back, across the pages, at one level. After completing the top level, the learner reads across the text at the next lower level. This procedure is continued until the entire text has been read.

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[1]This study was made possible through the financial support of the Carnegie Corporation of New York, and the cooperation of the Hanover, New Hampshire, School System, Arthur E. Pierce, Superintendent.
The authors also wish to express their appreciation to IBM for the use of the facilities of the Watson Scientific Computing Laboratory, New York City.

Reading a horizontal programed text involves much page turning. All the frames on any one level are allotted the same amount of space. This space limitation may influence the programer's construction of his frames; i.e., he may tend to make all frames of a uniform length. In a sense, these space limitations control the programer's behavior. When frame lengths vary, shorter frames will "waste" space. From the standpoint of printing costs, this is an important consideration.

Vertical programed texts are read from the top of the page to the bottom. The number of frames appearing on one page may vary from one to ten or twelve. A mask or slider is used with this mode of presentation. The learner exposes one frame at a time, together with the answer to the preceding frame, by moving the slider down the page. As each new frame is exposed, the learner writes his answer either in the textbook or on a separate answer sheet.

The vertical programed text does not require as much page turning as does the horizontal text; the problem of space limitation is also avoided. In both the horizontal and vertical formats, however, the programer's control over the learning sequence may be easily broken by the learner's turning ahead or back in the text. Neither of these modes of presentation is "cheat-proof"; both require a maximum of self-control on the part of the learner.

The question of control of the learner's behavior has been discussed in the literature for some time. Skinner (1958) and Holland (1961) have stated that the teaching machine gives more precise control over the behavior of the learner than does the programed text. Evans, Glaser, and Homme (1960) have commented that with a well-written program, machine control may not be necessary. Eigen (1960), basing his stand on previous research which has failed to demonstrate differential effects between presentation modes, has advocated that the programed-text format be used in initial field trials in school systems.

Each of these points of view has merit. The learner using a teaching machine must follow the "path" presented by the programer. Therefore, with this mode of presentation, the learner's behavior is almost entirely under the control of the programer. With programed texts, this control may be diluted. The learner using a programed text may deviate from the path set down by the programer by looking back in the program or looking ahead. However, this diminution of control may be compensated for if the program is well-written, if it holds the learner's interest, if the subject matter is not overly difficult for the learner, and if the learner himself is sufficiently mature to exercise self-control.

The major hypothesis of this study is: Mastery of subject matter is independent of presentation mode; i.e., there is no significant difference in mastery between machine, horizontal-text, or vertical-text presentations.

Subjects:

Seventy-seven 8th-grade boys and girls in the Hanover, New Hampshire, public school system served as subjects for the experiment. Their IQs (Pintner) ranged from 73 to 142 with the mean at 118.

Because of the limited number of machines available for this study, 18 subjects were randomly selected for the machine presentation before the remainder were randomly assigned to the two programed-textbook treatments. The number, mean, variance, ΣX and ΣX^2 of IQ scores for each of the three treatment groups -- machine (M), horizontal text (H), and vertical text (V) -- are given in Table 1. An analysis of variance of the IQ scores indicated that the three groups were drawn from the same population.

Program:

The program, "Numbers and Numerals,"[2] was mimeographed in three formats, on fan-fold paper for insertion in the Rheem-Didak teaching machine, as a horizontal programed textbook, and as a vertical programed textbook. The program consists of 65 frames. The machine-group subjects were provided with a special panel which incorporated material from eleven answer frames that were too long to fit the machine.

Procedures:

Subjects in the machine group worked individually in sound-insulated booths in an annex of the Dartmouth Medical School. Each subject used a Rheem-Didak 501 teaching machine. The day before the experiment began, the machine subjects were given a one-hour orientation lecture on the use of the machines by Dr. Edward J. Green of the Department of Psychiatry, Dartmouth Medical School. For both the orientation lecture and the experimental session, these subjects were transported to the Medical School annex by school buses.

The V and H groups worked with the programed-text formats in the cafeteria of the Hanover Junior-Senior High School, a familiar environment for all of these subjects. Each programed-text group was instructed in the proper use of its own particular format.

A ten-minute pretest consisting of true-false items and paragraph-correction items was administered to all subjects before they were permitted to begin the program. (The pretest, also used as a posttest and delayed posttest, is shown in Appendix A). During the first five minutes of the experiment, faculty members were permitted

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[2]This program is a unit (Chapter 1, Book 1) in Modern Mathematics. L.D. Eigen, J.D. Kaplan, and R. Emerson, Chicago: Science Research Associates, Inc., 1961.

to answer questions about the use of each format but not about the program's content.

As each subject finished the program, his time was recorded. After all subjects had completed the program, a group posttest was administered. Four weeks after the completion of the program, all subjects were given the delayed posttest.

Following the experiment, members of one of the 8th-grade sections which participated in the study met in a classroom for a discussion of their experience. A complete transcription of this discussion, conducted by Mr. Filep and Mr. Simpson, the Guidance Director of the Hanover Junior High School, is given in Appendix C.

Results:

This study tested the hypothesis that mastery of subject matter is independent of presentation mode; i.e., there is no significant difference in mastery between machine, horizontal-text, or vertical-text presentation. As summarized in Tables 2 through 11 (Appendix B), the results of this study indicate that the null hypothesis cannot be rejected.

The average pretest knowledge, in terms of the number of errors, was approximately the same for students tested with each mode of presentation (Table 2). There are no significant differences among the groups in posttest achievement (Table 3). Differences in gain (the number of posttest errors minus the number of pretest errors) were analyzed using a one-way analysis of variance. Again, no statistically significant difference between the groups was observed (Table 6). However, learning did take place within each of the presentation modes (Table 9). The average gain (reduction of errors) was approximately four to five points. Within each of the presentation modes the difference between mean pretest and mean posttest scores is statistically significant beyond the .001 level.

On each of the two parts of the posttest, there are again no significant differences among the groups (Tables 4 and 5).

The delayed posttest was administered four weeks after completion of the program. The results of this testing (Table 8) again show no statistically significant differences among the groups. However, it is interesting to note that retention is greatest for those individuals who used the machine and least for those who used the vertical-text presentation mode..

The experimenters in this study found that subjects using programed texts complete the program in less time than those using machines. This is in keeping with previous studies comparing machine with programed-text presentation as reviewed in Goldstein and Gotkin, 1961.

Although the three presentation modes do not differ significantly in amount of time taken to complete the program (Table 7), subjects using the horizontal or the vertical-text formats took less time than did those who used machines.

Although the program used in this study is brief, there is a wide variation in time taken to complete the program (Figures 4 and 5). With a longer program the time differences between the various modes of presentation may become even more disparate.

The performance of the vertical-programed-text subjects on the posttest and the delayed posttest is relatively independent of IQ and reading level, as evidenced by the correlations (Table 10). However, for the machine and horizontal-programed-text groups, IQ and reading level are significantly related to immediate and delayed posttest performance. The difference between machine and vertical-text format in correlation of IQ with posttest performance is significant ($p < .05$). These findings suggest an interaction effect of IQ and presentation mode. Table 1 shows

the two-way analysis of variance (IQ, split at the mean, versus machine and vertical-text modes) which yields an interaction approaching significance ($.10 > p > .05$). It is suggested that further research geared specifically to testing this effect is necessary in order to resolve the issue.

Discussion and Conclusions:

This study demonstrates, as have previous investigations, that differences between machine and programed-textbook presentation modes are not reflected in mastery of programed subject matter. In addition, this investigation has shown that differences between the vertical and the horizontal-text formats are not evidenced in differences in learning. The time-saving feature of programed texts as compared with machine presentation, as demonstrated in previous studies, is shown once again to exist.

The loss of the programer's control over the learner's behavior in the textbook versions of the program does not seem to hamper mastery of the programed material. Either the programer's control per se is not important, or else the diminution of the programer's control in the text versions has been compensated for in some manner.

Observations of the subjects as they were working with the program and discussions with them after the program had been completed indicate that difficulties were encountered with two modes of presentation. Those who worked with machines indicated that the equipment occasionally malfunctioned and that other operating difficulties occurred. Horizontal-text subjects complained chiefly about the excessive amount of page turning necessary to go through the program. No complaints were elicited from those subjects who used the vertical-programed-text format nor was any undue difficulty with this version observed by the

participating teachers.

Past research has indicated that "feedback should be immediate for maximally efficient learning to take place..." In this investigation, the most immediate feedback would be effected with the vertical-programed-text format since the subject need only move his slider down the page to reveal the answer to the previous frame. In this format, information is generally most easily accessible; previous and future frames and their answers are easily revealed. With the horizontal-text format, some searching through the text is involved if the subject wishes to "review." Accessibility of information is quite restricted in the machine mode, as employed in this study, since only one frame at a time is revealed and the subject cannot go back in the program nor can he go ahead until he responds to the frame on which he is working. The relation of accessibility of information to mastery of programed subject matter deserves further intensive study.

Results obtained in this study were based on the administration of a rather brief program. It would be interesting to discover whether any differences in a program of increased length would yield results at variance with those observed. The fact that differences in rate occur with a program as short as the one used indicates that classroom administrative difficulties encountered in the utilization of long programs will also obtain with shorter programs.

This study supports the view that both vertical and horizontal-text presentation modes are as efficient and effective as machines in bringing about mastery of programed subject material. In addition, although the difference is not statistically significant, the text modes produce a saving in time.

Since no significant differences, in mastery and time, are obtained between the horizontal and vertical-text formats, the question of

which format to select must be resolved on the basis of other criteria. The vertical-text format does not restrict the programer in the size of the frame he wishes to produce; it entails less page turning for the learner; and it is less expensive to produce from the standpoint of printing costs. Except for programs which incorporate a large number of copying frames, such as those which teach spelling, it seems reasonable to suggest that programs be published preferably in the vertical-text format.

Summary:

The primary interest of this study was centered on the relation between presentation mode and mastery of programmed instructional material.

Seventy-seven 8th graders with mean IQ of 118 were assigned to machine, horizontal-text, and vertical-text modes of presentation. The 65-frame program used was designed to teach differences between numbers and numerals.

Two major findings evolve. Inter-mode differences in learning are not statistically significant. Subjects using the programed texts complete the program in less time, although not significantly so, than do subjects who use the machines.

It is suggested that the interaction between IQ and presentation mode, and accessibility of information be studied more closely. An additional suggestion is made that, except for programs consisting mainly of copying frames, the vertical-programed-text format be used.

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APPENDIX A

Test for Numbers and Numerals

(use pencil only)

Name_____

True or False — Answer

1. 2 is a numeral. _____
2. '3' is a numeral. _____
3. 2 + 3 is a number. _____
4. '2 + 8' is a number. _____
5. 6 is larger than 8. _____
6. '7' is larger than '4'. _____
7. 3 + 2 = '5'. _____
8. Nine is a number. _____
9. A number is a symbol for a numeral. _____
10. Which of the following is not a numeral for 3?

    '3' 'III' $\frac{\text{'12'}}{4}$ '3 - 2' '8 - 5' '2 + 1' _____

11. A student wrote the following letter to his friend. He did not know the difference between numbers and numerals. He did not know when to use single quotation marks. You should add the quotation marks where they are needed. (You may erase if you make an error.)

Dear Bob,

Yesterday we learned some more about numbers. We learned about the numbers, eight and nine. You write an 8 to represent eight and a 9 to represent nine. We learned that we can also write nine to represent nine. We learned that the Romans used IX to represent 9. We found out that if we take 80 away from 88, we get 8 left. Also, if we take 8 away from 88, we get 80 left. 8 is nard to write. It was easier when we learned about numbers less than 5.

Your friend,

Peter

1. Is 5 larger than 3 ? ☐ (yes or no)

The question you were asked is: is 5 larger than 3 ? If you answered yes, you were correct, since the number 5 is a larger number than the number 3 . If you answered no you were also correct, since the ink on the page which is 3 is a larger symbol than the ink which is 5.

2. Take away 2 from 22. What is left?

☐

You probably gave 20 as the answer; that would have been correct, But there is another way to answer this question. Because 22 is made up of two 2's, the other answer could be 2: If you took one 2 away from 22, only one 2 would be left.

3. The last question was actually a tricky one, and it did illustrate a difficulty in mathematics. Here is a similar question: What is half of 8?

You probably gave 4 as the answer, and that would have been correct. But some people might say that half of 8 is °, and they would also be correct. ° is one-half of 8, and ₀ is the other half. If you put ° and ₀ together, you get 8 .

1. Is 5 larger than 3 ?
(yes or no)

12. To tell the difference between symbols and numbers we use single quotation marks ' ', to show that we mean the symbol.
'3' is larger than '5', since '3' and '5' mean we are talking about the symbols and not the n .

23. '9' is larger than '6'.
[ ] (true or false)

34. The Romans had a special numeral to represent 3. It was 'III'. Now we have three numerals which stand for 3. They are: 'III', '3', and [ ].

45. Which word should have quotation marks?
Five is a numeral for 5.
[ ]

56. 2/3 + 2/3 = 4/3
[ ] (true or false)

A

1. The question you were asked is:

   is 5 larger than 3 ?

   If you answered yes, you were correct, since the number 5 is a larger number than the number 3 .

   If you answered no, you were also correct, since the ink on the page which is 3 is a larger symbol than the ink which is 5.

B

12. numbers

C

23. false

   We are talking about the symbols.

D

34. 'three'

   Don't forget the quotation marks.

E

45. five

F

56. true

APPENDIX B

Tables and Figures

Table 1

IQ

	M	H	V
ΣX	2,097	3,231	3,760
ΣX^2	249,165	380,361	463,500
$\bar{X}$	116.500	115.393	121.290
σ^2	286.147	278.749	248.320
N	18	28	31
1 way analysis of variance	F = .323	N.S.	
2 and 74 degrees of freedom			

Table 2

Pre Test Total (PRE)

	M	H	V
ΣX	180	269	316
ΣX^2	1,984	2,695	3,484
$\bar{X}$	10.000	9.607	10.194
σ^2	10.824	4.718	8.757
N	18	28	31
1 way analysis of variance	F = .343	N.S.	
2 and 74 degrees of freedom			

Table 3

Post Test(PTT)

	M	H	V
ΣX	89	160	162
ΣX^2	617	1300	1256
$\bar{X}$	4.944	5.714	5.226
σ^2	10.411	14.287	13.646
N	18	28	31
1 way analysis of variance			
2 and 74 degrees of freedom	F = .323	N.S.	

Table 4

Post Test Part A (PTA)

	M	H	V
ΣX	17	25	23
ΣX^2	39	51	45
$\bar{X}$	0.944	0.893	0.742
σ^2	1.351	1.062	0.931
N	18	28	31
1 way analysis of variance			
2 and 74 degrees of freedom	F = .266	N.S.	

Table 5

Post Test Part B (PTB)

	M	H	V
ΣX	72	135	142
ΣX^2	422	903	930
$\bar{X}$	4.000	4.821	4.581
σ^2	7.882	9.339	9.317
N	18	28	31
1 way analysis of variance			
2 and 74 degrees of freedom	F = .457		N.S.

Table 6

Gain*

	M	H	V
ΣX	267	451	475
ΣX^2	4155	7665	7829
$\bar{X}$	14.83	16.11	15.32
σ^2	11.441	14.840	18.359
N	18	28	31
1 way analysis of variance			
2 and 74 degrees of freedom	F = .622		N.S.

*20 has been added to each gain score to facilitate computation. The absolute gains in general are negative since there was a reduction in number of errors from PRE to PTT. Thus $X_i = 20 + PTI_i - PRE_i$

Table 7

Time (in minutes)

	M	H	V
ΣX	541	768	833
ΣX^2	16,593	21,468	23,297
$\bar{X}$	30.05	27.43	26.87
σ^2	19.59	14.92	30.45
N	18	28	31
1 way analysis of variance		t = 2.02	t = 2.17
2 and 74 degrees of freedom		F = 2.742	N.S.

Table 8

Delayed Post Test (DPT)

	M	H	V
ΣX	108	182	249
ΣX^2	996	1814	2709
$\bar{X}$	6.35	7.28	8.03
σ^2	18.233	19.536	22.944
N	17	25	31
1 way analysis of variance			
2 and 70 degrees of freedom		F = .728	N.S.

Table 9

Comparison of Pre Test and Post Test

	M	H	V	T
Mean Pretest	10.000	9.607	10.194	9.935
Mean Post Test	4.944	5.714	5.226	5.337
Difference	- 5.056	-3.893	- 4.968	-4.598
N	18	28	31	77
t*	4.657	4.804	5.843	8.958
Degrees of Freedom	17	27	30	76
Level of Significance	P <.001	P <.001	P <.001	P <.001

* The null hypothesis tested by t is: The mean PRE is equal to the mean PTT.

IQ	.933** .885** .894** .897**	-.719** -.581** -.260 -.479**	-.271 -.424* -.113 -.222	-.479* -.347* -.147 -.294	-.521* -.269 -.439* -.400**	-.639* -.514** -.166 -.426**	-.562* -.545** -.246 -.422**	-.762* -.578** -.150 -.416**
Reading Level	-.787** -.588** -.131 -.449**	-.468 -.526** -.221 -.366**	-.344 -.301 .040 -.166	-.480* -.302 -.427* -.397**	-.648* -.528** -.094 -.413**	-.637* -.550** -.106 -.389**	-.751** -.573** -.067 -.396**
Post Test Total	.493* .232 .194 .264*	.495* .859** .732** .740**	.177 .293 -.069 .076	.517* .771** .653** .657**	.935** .977** .984** .971**	.723** .534** .615** .600**
Pre-Test Total	-.502* -.298 -.526** -.451**	-.020 .022 .161 .077	.400 .192 .147 .227*	.401 .222 .209 .250*	.260 .201 -.034 .110
Gain Total	.276 .276 -.171 .032	.113 .656** .464* .451**	.522* .842** .708** .722**	.481* .418* .557** .481**
Time	-.045 .319 -.025 .087	.223 .255 -.074 .059	.457 .266 .009 .132
Post Test Part A	.180 .617** .551** .475**	.514* .530** .350 .434**
Post Test Part B	.618* .482** .577** .552**
Delayed Post Test Total	

TABLE 10

Matrix of Correlation Coefficients for M, H, and V groups and Total Sample

(In each cell the upper coefficient is for group M; the second for group H; the third for group V; and the fourth for the total sample.)

* significant beyond the .05 level
** significant beyond the .01 level

A red line connecting two correlation coefficients in the same cell indicates that the correlation coefficients differ significantly beyond the .05 level.

Table 11

Mean Post Test Scores for M and V Groups split into High and Low IQ Groups*

	M	V
High IQ	3.13	5.05
Low IQ	6.40	5.60

2 Way Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F
IQ	26.03	1	26.03	2.18[a]
M and V Groups	.91	1	.91	.08
Interaction	23.71	1	23.71	1.99[a]
Within	536.62	45	11.92	
Total	587.27	48		

* The mean IQ (118) was used to split the group. The high IQ group includes all subjects with IQ $\geq$ 118.

a Both of these critical ratios are "marginally" significant. That is .10 > P > .05

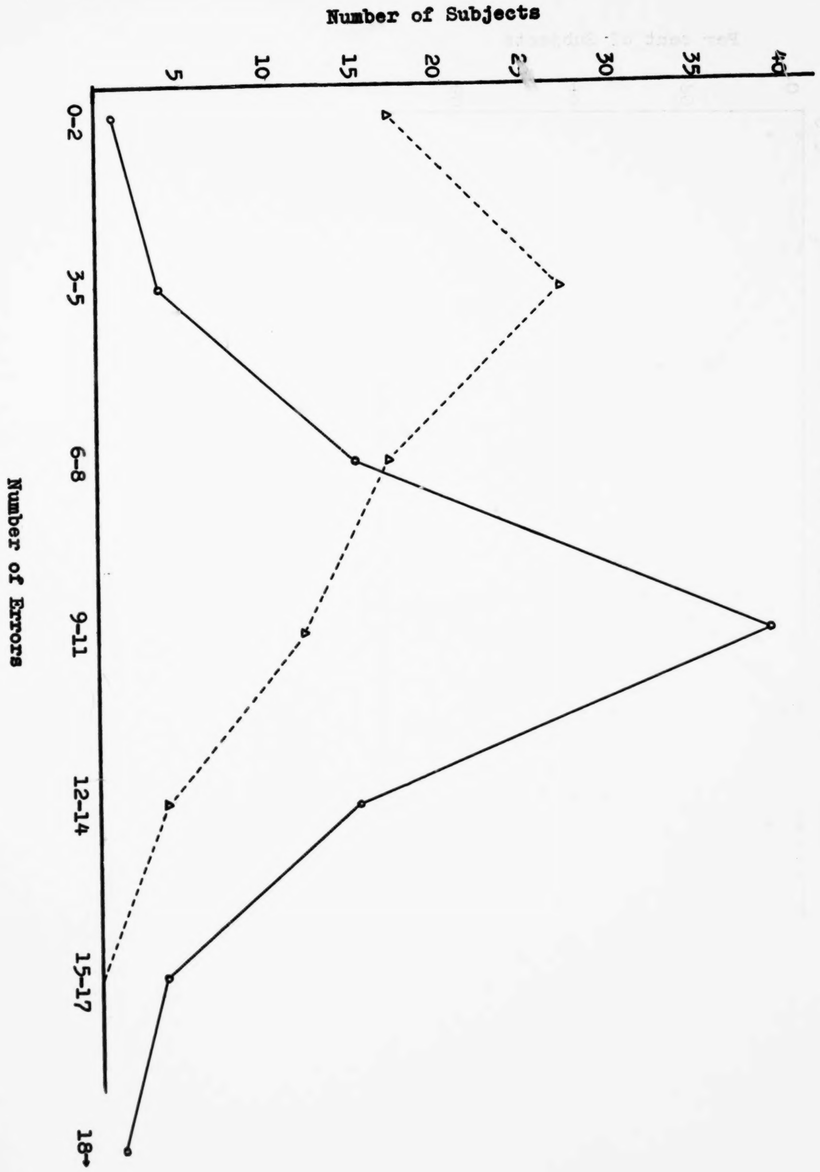


Figure 1
Frequency Distribution of PRE and PTT

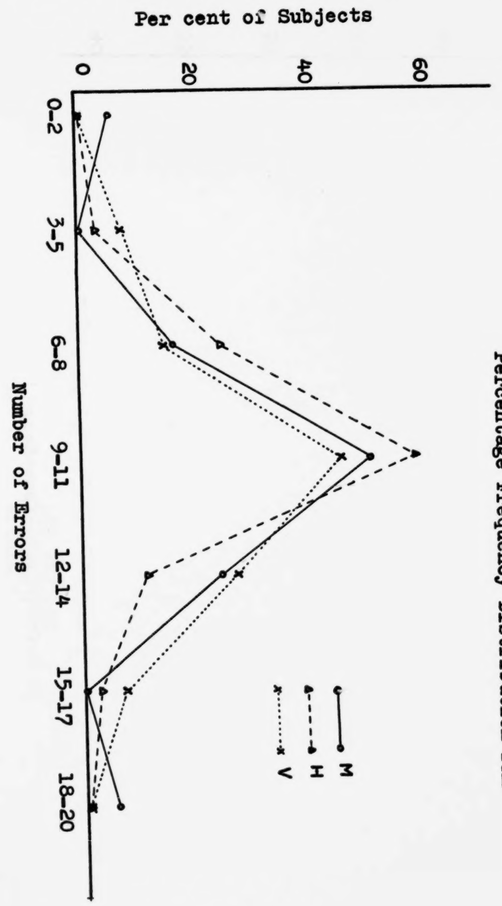


Figure 2
Percentage Frequency Distribution PRE

Figure 3
Percentage Frequency Distribution PTT

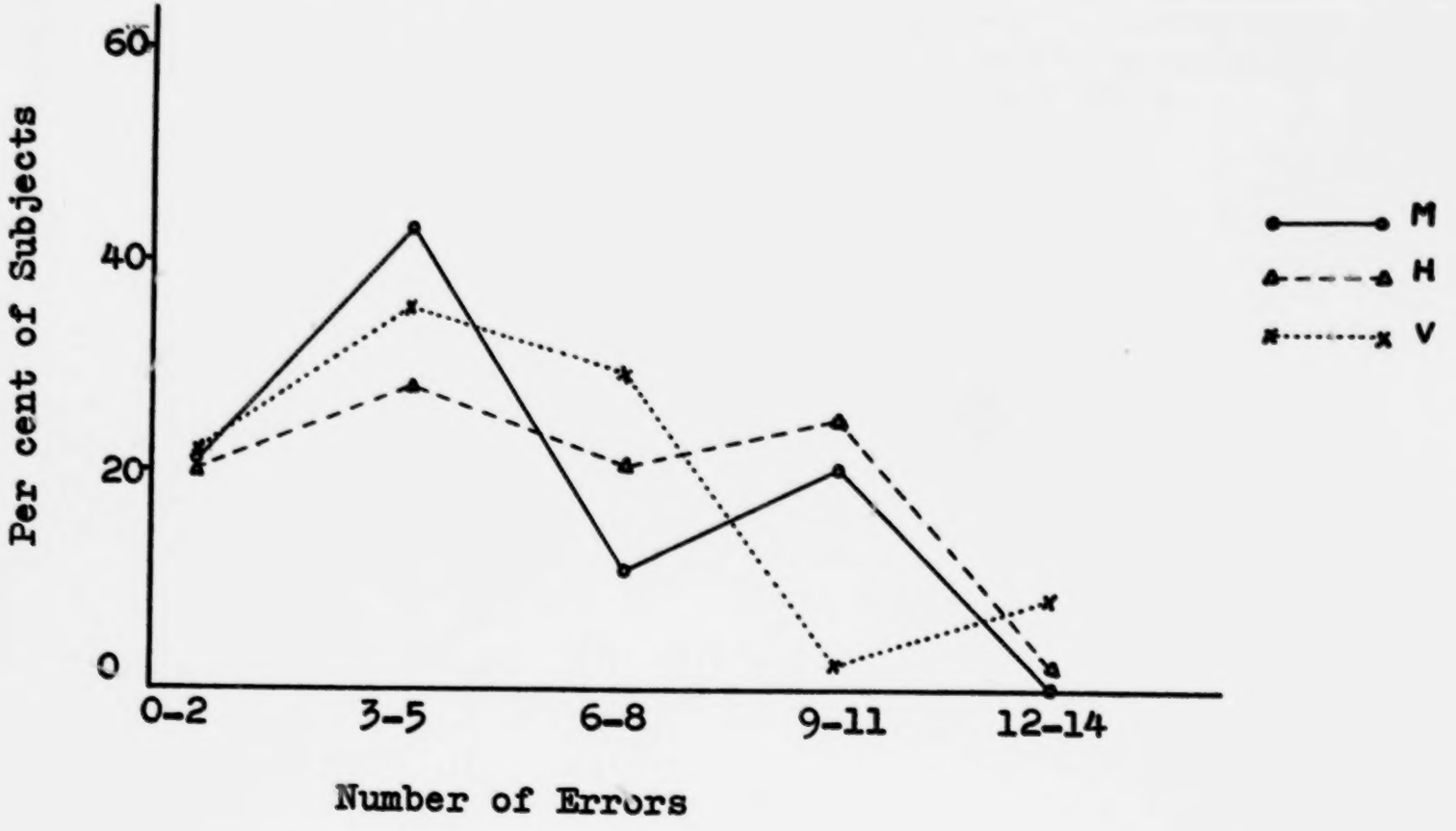


Figure 4
Percentage Frequency Distribution of Time
Entire Experimental Population took
to Complete Program.

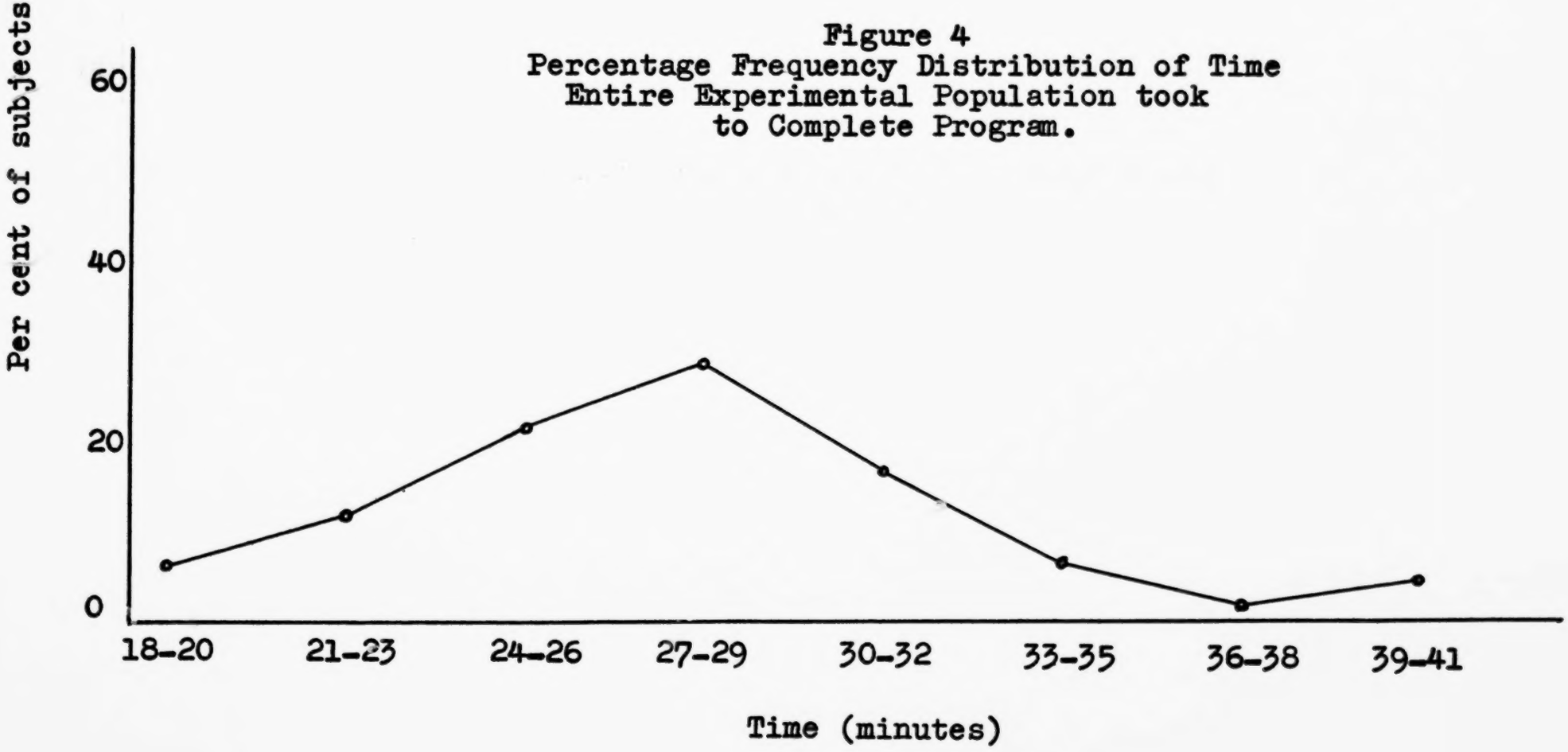
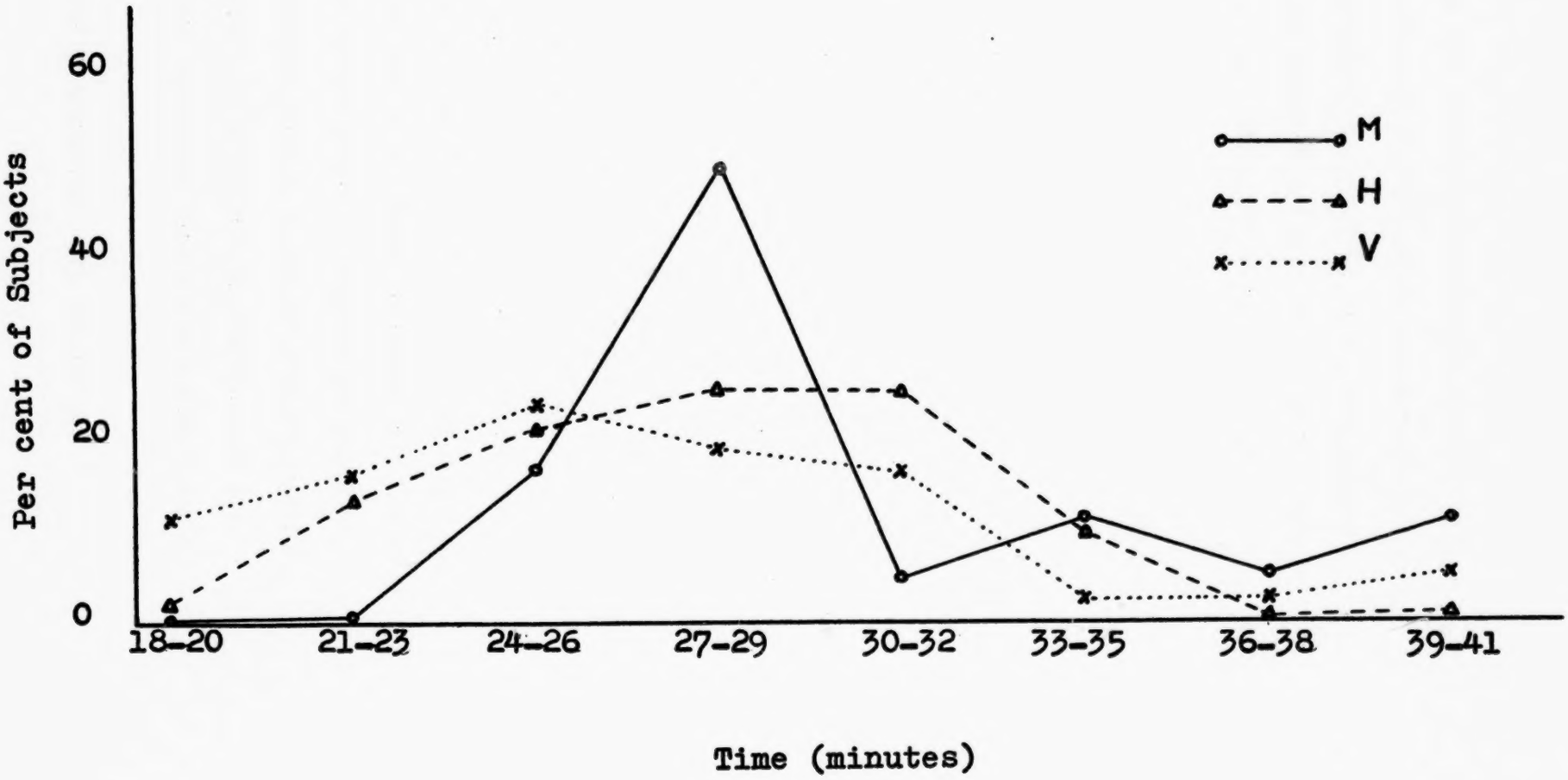


Figure 5
Percentage Frequency Distribution of
Time Groups M, H and V took to
complete program.



Comments on the Discussion with Subjects

The statements made by the students indicate superior insight concerning the modes of presentation, methods of controlling the learner's behavior, and the learning theory underlying programing. They also were highly cognizant of the larger curriculum issues involved in the implementation and use of programed materials. These students did not have previous experience using programed texts or teaching machines. Their comments are indeed cogent when one considers that this was their first exposure to programed materials.

Eighth graders in the Hanover Junior High School are grouped by ability into four sections, one of which participated in the discussion. This group is considered by the faculty to be slightly more verbal than the other sections. Nevertheless, it approximates an average group. Subjects refer to themselves as Indians (Horizontal), Bears (Vertical), and Tigers (Machine). These are the well-known names of the local and visiting collegiate athletic teams. The comments given below cannot be generalized as representing the opinions of all the students involved in the study. However, they do focus on a number of the variables under consideration.

Some of the comments made concerning the modes of presentation include:

"The thing I found really most irritating is the fact that if you turn the little knob to get the next answer to come up... this I found very distracting and rather unpleasant and it sort of slowed me down."

"The main point of the vertically set-up ones was that I was used to it because all the rest of our texts go vertically and you don't have to keep turning pages."

"I was an Indian but I think the Bears, from the way it was set up didn't have to keep turning the pages. I thought that slowed me down an awful lot."

The students were very alert to ways in which attempts were being made to control their behavior and deter them from cheating. Some of their comments included:

"Sliding them down, sometimes you slid it down to see the answer -- I mean you slid it down to see the question, you could see the answer."

"I think that was one of the advantages of the horizontal books, because you didn't have any chance of seeing the answer when you were doing a problem, because you had to turn the page to get it, and I think you learn better without seeing the answer first."

"I think the machines are pretty good because they -- you know, relieve you of any tendency to try to cheat."

"I didn't look and I don't think many people would, because you --- I don't know, you have a feeling you just want to get the right answer by yourself, and you're not learning anything by looking. And if I did --- the purpose of it was to see how you've learned it."

Other comments, made by the students relating to immediate feedback, size of steps, and other aspects of learning theory involved in a program, included:

"If you make a mistake on a test with our texts as we have them now in our school, you could, --- well, sometimes teachers don't get to correct them for weeks, and we go on making the same mistake for weeks, and you get used to it, and then you have to spend another week getting out of the habit and you waste a lot of time that way."

"There wasn't a big jump from anything first-gradish to something you didn't understand."

A number of similar ideas were expressed when students stated "you

found your own mistakes and you punished yourself for them," and "the program taught you to learn it, instead of just presenting it to you," or "it just didn't get monotonous - you wanted to keep going."

Two students who experienced different modes of presentation voiced the following opinions regarding mastery of subject matter:

"I've learned more about numerals and numbers than I would have in several weeks."

"Well, I learned a lot about numerals and numbers, more so by the programed text than I would've in several weeks."

The majority of students did not wish to attend a school where the only mode of presenting subject matter was via programed texts or machines. They reacted to a hypothetical school of this sort in the following manner:

"It would get boring if we had it all day in every subject."

"Some things just can't be explained on a machine as well as a teacher can in class but you can go ahead on your own if so desired."

"I think it should be either every other day or half the period, and half with teachers."

"It would be helpful with homework."

"It gets sort of boring after awhile, and it's a lot easier to learn if you have class discussions because different people get different ideas about what they read even if it's in the same text."

"I think that mathematics and sciences, spelling and grammar would probably be best. These are all my particular weaknesses, and I can't find anything quite exciting about any of them."

The students raised a number of questions associated with the variables under question, as well as others directly related to the field of programed instruction. Their comments regarding modes of presentation, the cheating problem, mastery of subject matter, psychological principles underlying programing and the larger curriculum issues demonstrate a great deal of insight. Many of the questions they raised are worthy of further investigation.

APPENDIX A
Discussion with Subjects

The following is a direct transcription from a tape recorded conversation held with the subjects of the experiment, Mr. Robert Filep, one of the experimenters, and Mr. Simpson of the Hanover, New Hampshire Public school system. The transcription was prepared by the Typewritten Transcription Company, New York City, and is unedited.

Since the group was so large, it was difficult to get a high quality tape recording of the discussion and at times the conversation becomes inaudible. The transcriber has either indicated this by capital letters or by horizontal lines to indicate that words are omitted because of indistinctness of sound.

MR. SIMPSON: So as to record this, so you will know, it's the 8th grade group from Hanover High School in Hanover, New Hampshire, that took part in an experiment this morning, dealing with program text material and teaching machines. We have three groups, labelled Indians, Tigers, Bears. Each group was asked to use material that was very similar, in one sense, and yet was differently arranged, either in your texts or in the teaching machine.

This was not a test, but a teaching exercise, and we have been trying to score over there, just the last few minutes, your pre-test and also your post-test, to see just how much you learned from this teaching exercise, and we're interested in your reaction to this method of teaching, and just how effective it is.

I'm sure that you have sat around and had some very lively bull sessions about this since you finished with the work this morning. I wonder what your reaction is to the type of teaching that was used, where teachers were not involved but you were working pretty much with pencil and paper. We find some rather fascinating results from what we've observed so far, just on the pre-test and the post-test.

Now, what is our reaction, just as a general question, for this type of a teaching exercise? Who's ready to start here? Maybe my question isn't specific enough here, but I know you've had a lot of excitement with this this morning. Yes, E.S.?

E.S.: I'm E.S.. I took part in the learning machine experiment. I found that being in that booth was not exactly helpful when the tape for the learning tape in the machine ran out, or jammed, or needed instruction, or didn't understand something. I found that, and the fact that a couple of kinks in the machine seemed to happen, and that slowed down your time. We were timed on this. Another thing, being in a booth, you can't very well signal the fellow who's taking down the time. These are my main objections. As far as the learning part goes, I'm certain I've learned more about numerals and numbers than I would have in several weeks.

MR. FILEP: Anyone else feel that way? Or, how about some of the Indians or Bears?

D.E.: D.E. Well, I think that it helps you a lot to use the programed test, because the learning for the students that are more advanced can go faster along, and instructors will help the slower students along in the textbooks, and everybody can keep going on their own ability. When they run into trouble, then they can start asking questions about the material.

MR. FILEP: D.E., have you ever used this kind of programed textbook before this morning?

D.E.: No.

MR. FILEP: This was the first time? All right, who else? You were which, Indian or Bear?

D.E.: Bear.

MR. FILEP: You were a Bear? So you had the vertical (?)

MR. SIMPSON: Did you come to something where you would like to have stopped to ask questions?

D.E.: Well, no, because it's presented so it just progresses slowly along, so you never run into – you know, take a big jump from easy material into very difficult material. It takes you along gradually.

MR. FILEP: All right, how about some of the others? Did some of you feel that way about the programed text or the vertical text? How about this young lady right here? You were what, an Indian or a Bear?

N.S.: Indian.

MR. FILEP: And your name is?

N.S.: N.S.

MR. FILEP: All right, N.S., what was your reaction?

N.S.: Well, I learned a lot about numerals and numbers, how much more so by the programed text than I would've in several weeks. I also think that the way it gradually moved along – I mean, there wasn't a big jump from anything first-gradish to something you didn't understand. And I think I'm all for the program. *(This is only an attempt at the gist of her words, since she speaks very softly and is all but inaudible.)*

MR. SIMPSON: Which type of the text were you using? The one that went from page to page, or – ?

N.S.: No.

MR. SIMPSON: You were vertical. She's a Bear, that's right.

MR. FILEP: How about using –– all right, go head.

Y.Y.: I'm Y.Y. I was using the horizontal setup for the test, an Indian. I liked it mainly because it taught you to learn it, instead of just presenting it to you. After you get along into the difficult stuff, then, even though you wouldn't know anything about that, if you just started and looked at that one, you'd feel stupid if you got it wrong, and then you won't make that mistake again.

MR. SIMPSON: Did you mind if you got any of them wrong as you went along, Y.Y.

Y.Y.: I made a few mistakes, and some of them were mostly carelessness.

MR. SIMPSON: And could you sense what was wrong so you could rearrange your thinking, and you went on to the next question?

Y.Y.: Yes. Some of them I thought one answer would be it, and I'd write that down and then erase it and put the wrong one in.

MR. SIMPSON: All right, D.E.?

D.E.: D.E. Well, the main thing, I think, that really helps you on the programed text is, as you go along and write down the answers, you can find that you make a mistake, and usually on the harder ones they'll give their explanation of why that's the right answer. I mean, that's what mainly helps you. And then, after you see what the answer is, you could take a couple of problems like that – different ones that you make up yourself, which wouldn't be too hard – and go over them, and so you don't make the same mistake again. Do a couple of extra problems.

E.S.: E.S. again. I feel that the thing about the machine learning that stimulated me was the fact that you didn't have your papers corrected later, as you would with a teacher; you found your own mistakes, and you yourself punished yourself for them. And the honor student who really wanted to learn would follow the machine; there isn't much chance of cheating. But after I got the right answers, I was pushing cranks and turning levers, and found myself much excited. And just as Mr. D.E. is stating, you go very gradually; you don't learn much from the first few questions; and after that, you move very slowly.

MR. FILEP: E.S., have you ever used the machine or programed instruction before?

E.S.: No.

MR. FILEP: Has anyone in the group? Let's just see a show of hands. Is this the first time for everyone this morning? *(Several words indistinct)* All right, let's get the other side of the circle giving us some ideas. How would you, for instance, some of you fellows over there like to use this? All right, go ahead.

L.L.: Well, I don't know how I'd particularly like to use it –

MR. FILEP: Your name and group?

L.L.: L.L., and I was in that programed text going down vertically. I was a Bear. Well, I found that this didn't tax your memory very much, and a lot of questions were just hit and miss, and if you got it, it was right; if you didn't get it, it was wrong. And I like the way it gradually brought you into it, except some problems you came upon them and they were still that hit and miss – I mean, they didn't have anything to do with what you were gradually being brought into. And another thing, which is very minor, except I made a mistake on it. It was a typographical error on – a word was emphasized in the problem, it was used about 3 or 4 times, and then down in the parentheses the word we were supposed to mark started off with N, and the word that was being used quite a bit started with M, so I put that down, and then as I moved the cardboard down and looked at the answer, I found it started with N.

MR. FILEP: Uh huh. So a fair number of you ran into that same thing. How about some of the rest of you fellows over there? All right, go ahead.

N.D.: N.D. I was an Indian, but I think the Bears, from the way it was set up – I mean, you didn't have to keep turning the pages. I thought that slowed me down an awful lot. But if you could just move the cardboard down a little ways – I don't know how it was worked out, but I think it'd be much better to use the cardboard idea.

MR. FILEP: All right, did anyone else feel, between the Indian and Bear group, that this was something they would rather try, or – let's hear from you.

D.N.: I'm D.N., and I was a Bear. The main point of the vertically set-up ones was that I was used to it, because all the rest of our texts go vertically, and you don't have to keep turning pages. And so, that's one main point that I thought about it as I went along in that book. And I also liked very much the way it was set up, because everything that was covered in the questions, in the little boxes and things, was covered up – had already been covered, so that if you made a mistake you could go back and look over what had already been gone over, and you skipped over something. And another thing is that if you make a mistake on a test with our texts as we have them now in school, you could – well, sometimes teachers don't get to correct them for weeks, and we go on making the same mistake for a week, and you get used to it, and then you have to spend another week getting out of the habit, and you just waste a lot of time that way.

MR. FILEP: So you like the idea that the answer's there and you can check it right away?

D.N.: Yes.

MR. SIMPSON: You just report those teachers to us, and we'll drop them. *(Laughter)* How do – let's stay with the vertical people for a minute, the Bear group. Did you have a tendency to look at the answer's? I mean, be honest, did you pull your slider down and look at it? Go ahead. *(Possibly???).*

UNIDENTIFIED BOY: Well, yes, as a matter of fact, I did, when I was just turning the page and the answer – you could see about four answers at a time, and I think that you could have some kind of a cardboard on each page that just slid down, and then when you're finished with that page slide it back as you turn the page over, there'd be another cardboard right there ready for you.

MR. FILEP: How about some of the other vertical people? All right, your name is?

Y.T.: Y.T. And sliding them down, sometimes you slid it down to see the answer – I mean, you slid it down to see the question, you could see the answer. You know, sometimes it wasn't even, then you could get them so you could see them.

MR. FILEP: Did you have a tendency to go ahead and look at the answers anyway?

L.L.: Well, no, I didn't – L.L. – no, I didn't, but as you move it down – well, it's kind of spread, it was like that – as you moved it down, it was too far up here and you couldn't see your answer to the problem you'd just worked out, and as you moved it down you had a tendency to pull it down too far and see another answer below it, and then slide it back.

N.S.: I think that was one of the advantages of the horizontal books, because you didn't have any chance of seeing the answer when you were doing a problem, because you had to turn the page to get it, and I think you learn better without seeing the answer first.

MR. FILEP: And how many of the Indians turned over the page to look for the answer, saw the answer first? Be honest, did you take a peek to see what the answer was, or do you agree with N.S.? How about some of the – there are some Indians over here. *(Laughter)* Did you find yourself? Let's hear from you. Did you find yourself looking? You're an Indian, I can tell. *(Laughter)*

N.Y.: N.Y. I thought that the Indians had, in this programed text, the better of the two, because you turn the page afterwards and you find the right answer, and there'd always be an explanation of – when there was any question on it. I didn't look, and I don't think many people would, because you – I don't know, you have a feeling you just want to get the right answer just by yourself, and you're not learning anything by looking. And they did – the premise of it was to see how you've learned it.

MR. FILEP: All right – *(several words indistinct).*

N.Y.: Well, when you have the cardboard, if you had something to cover the answers while you worked and did the whole page, and then checked them and go over the ones you had wrong, I think that would be better. I don't like the idea of turning all the pages all at once.

MR. FILEP: All right, anyone else on this? Go ahead.

D.N.: D.N. And I think another disadvantage of the horizontally set-up one was that some of them that were true and false would just give true or false, and then on the other hand, some of them that were and false, some of the harder ones that were true and false, would give true or false and the reason, and sometimes the ones that you'd think were hard didn't give the reason, so you'd look for the reason and you'd see the next answer, and so it got you mixed up a little bit on a problem.

MR. FILEP: And you were on the vertical text?

D.N.: On the –

MR. FILEP: Horizontal? You were an Indian?

D.N.: No, I was a –

MR. FILEP: A Bear?

D.N.: – on vertical.

MR. FILEP: Vertical. Okay. *(Several words indistinct).* Oh, we have lots of . Now, who hasn't – all right, the young lady in the blue dress. Your name?

Y.D.: Y.D. I was an Indian, and I think it would help if they'd draw the lines between each problem, so when you look down on the page there'd be – I mean, first one, number one, and then underneath it would be a line before you came to another problem, so that when you're just going through the pages it'd be much easier –

MR. FILEP: You mean you had a tendency to go from number one to number twelve, instead of turning the page?

Y.D.: No, but when you're looking at the answers, they're close enough so you can get them confused.

MR. FILEP: Oh, I see. On the answer page?

Y.D.: And if you have a line between them, it'd help, I think.

MR. FILEP: All right, anyone else feel that way? All right, you go ahead.

N.Y.: N.Y. again. I was an Indian, and I – several times there were no lines and I wished there were, because I'd look at the right question and put the answer – or I'd read the whole long question and I wouldn't understand it because it would be a whole thing that we hadn't covered yet, and I'd put the answer and then turn it over and look at the right answer, because the answers were further apart and the questions were pushed together ––

MR. FILEP: You wonder why that answer –– *(several words indistinct.)*

N.Y.: And then I'd go back and have to erase it and put the other answer in on top of it.

MR. FILEP: All right, this young lady here. You're – ?

Y.F.: Y.F., and I was a Bear, and I don't think that you should do the whole page and then check the answers, because if you make a mistake on the first one, it may be continuous, and you'd get all of them wrong and have to do them all over.

MR. FILEP: Right. So you shouldn't be checking each answer as you go along. D.E.?

D.E.: D.E. again. One thing that I found – Mr. Osgood, our math teacher, had a horizontal programed (?) textbook on sets (?) – and we did a vertical one, and I found that I think the horizontal one is better than the vertical because – you know, as you're sliding down the cardboard, for instance, some answers end and then a new one'll begin right next to it, and as you slide down the cardboard – sometimes you're sliding the cardboard down and you give it a little extra jerk and then there are the answers for the rest of them, just below that. And in the horizontal textbook there isn't any chance of seeing the next answers coming up; and I think it's easier to work on the horizontal, also.

MR. FILEP: All right, has anyone else worked with both the sets and then was on the vertical book today and had the same experience that D.E. had? That was interesting, very much so. All right, L.L.?

L.L.: Well, I looked at Mr. Osgood's programed text also, and I think a solution to the problem – no matter how long the problems were, it had them evenly spaced and had the answer, so that as you slid your thing down it would just be right here and you wouldn't have to pull too far and go back.

MR. FILEP: All right, well, you can realize what some of the problems are there, though, when you get into more complex material and the person who's writing the program wants to give you more material and help you understand all the answers so you can go on to the next one. It's a valid point, a very valid point. Miss Y.F.?

Y.F.: Well, I don't know if this would work, but I think it might be easier and solve the problem of seeing the answers – would be just to have a long stick – thing on there, not too long – *(several words indistinct)* – you would have to turn more pages, but you wouldn't have the problem of slipping down or something – just turn over one. But you would have to turn a lot of pages, but you wouldn't have any chance of seeing the answers – the answers'd be on the back.

MR. FILEP: All right, go ahead and start.

UNIDENTIFIED BOY OR GIRL: Well, on the book that the Indians used, they could split the pages so that each question goes on a narrow strip and attached to the middle. You'd just have to turn the little strip of paper, and then you'd flip it back and start on the next one, and that would solve turning over the whole page.

MR. FILEP: Go ahead.

Y.Y.: Y.Y. again. I don't think that idea is such a good one, because if you bungled the thing up, one thing, it would be easier for the pages to rip. And I found no difficulty finding which question belonged to which answer at all; it's just, on some of them you know where you are, and a lot of times when you fix your eyes on one question and just keep them about the same position as the answers, for one thing, then –

MR. FILEP: All right, fine. The gentleman over there?

E.L.: E.L. Mr. Osgood's thing on sets(?) that had the answer on the back of the first sheet, and I think that would save turning lots of pages, because we all have to turn two pages, and if you could just turn one page and have the answer to the next problem ––

MR. FILEP: Were you in the Bear group? Did you have a vertical text, E.L., or were you an Indian?

E.L.: Horizontal.

MR. FILEP: So you used horizontal, and you've also seen the sets(?) program? All right, Y.B.?

Y.D.: I like the horizontal, because you don't have to worry – you're not going to see the answer unless you want to look; and also, it doesn't – I mean, I don't see anything wrong in turning over the pages – (*several words indistinct*).

MR. FILEP: All right, one more, L.L.?

L.L.: L.L. Well, I would like an explanation for a few of the questions that are on this test, like why do you smell problems, or something like that?

MR. FILEP: Uh huh. Why do you smell a number, or can you smell a number?

BILL: Yes.

MR. FILEP: All right, what's happening in this early part of the program is to start where you're at. I mean, let's assume that you don't have any knowledge of numbers and numerals, and it's just to get you to start thinking about numbers and numerals, and whether you can smell a number, for instance, whether you can see it. It sounds kind of foolish, but it makes you stop and think, doesn't it? I mean, what is this thing, numbers, is it something you just see, or is there a symbol for it, and the person who wrote the program is trying to do just that, start where you're at, for instance, with take 2 away from 22 – everyone can do that, and you may get 20 or you may get another 2 as you learn from the program. But the idea is to start with something that everyone knows and then help you move step by step into something that's a little more complex. Did any of you discover that you were being distracted to the extent that you couldn't go through the programs, either by the horizontal or by the vertical or by the machine texts? Did any of you feel you really slowed down in following the problems because of the format that you were using? All right, this gentleman here.

E.R.: I'm E.R., and I tried it with the machine, and I think when everybody was turning all the levers and stuff, the machine made an awful lot of noise and was kind of distracting to try to work. And I think the machine's pretty good, because they – you know, relieve you of any tendency to try to cheat. And also, it's a very good idea of showing the answers, so you don't get the mistake later on.

MR. FILEP: All right, go ahead.

E.S.: I'm E.S. I was also in the machine group. I disagree with Mr. E.R. completely. I don't think the noise of the levers is distracting, not if you're really interested in your work. I also noticed after I'd finished my test that these little booths were pretty thickly padded, so that if you threw something in a fit of rage or something of that nature, it wouldn't bother the person next to you. (*Laughter*) The thing I found really most irritating is that fact that if you turn the little knob to try and get the next answer to come up, to do this you had to pull a lever that showed you the answer, then you'd turn the knob until the question was right next to the edge of the slot – and if you didn't do this, once you'd written your answer and opened the slot, the answer wouldn't appear. This I found very distracting and rather unpleasant, and it sort of slowed me down.

MR. FILEP: All right, any other feelings about this? All right, how would you like to go through – all right, is there a response? Yeah? All right – how would you like to have this used(?) – I mean, for instance, would you like to have this all – supposing you came to school and you had eight periods of working with programed textbooks or with teaching machines and things of this sort? How would you feel about that? Right here.

N.N.: N.N. I was one of the Bears. Well, the only thing I wouldn't like about that would be, it gets sort of boring after a while, and it's a lot easier to learn if you have class discussions, because different people get different ideas about what they read, even if it's in the same text; if it's presented to them the same way, they get different ideas, and the only way you can really decide which is best is discuss it, and just using the text wouldn't be any discussion.

MR. FILEP: Okay, we haven't heard from –

MR. SIMPSON: There are some new ones here.

MR. FILEP: Yes, we haven't heard from –

N.K.(?): *(This name is not on the class list, but this is what it sounds like.)* I'm N.K.(?), and was on the machines with the Tigers. Well, I agree with N.N. on the fact that it would get boring, but with some subjects, such as math, if we're assigned a page of problems and we just do them, we don't – *(several words indistinct)* – getting anywhere, or any – we don't have any *feeling* of achievement, and also you don't know if you're doing them right until the next day. I believe with machines we would, at least in that subject, have a feeling of achievement and be moving along. Okay. But as for spending the whole day on it, I wouldn't agree with that, because some subjects it just wouldn't be helpful to the student coming to, say, a really big test, and some things that just can't be explained on a machine as well as a teacher can in class.

MR. SIMPSON: Y.N.?

Y.N.: Y.N. I'm an Indian, and I agree a lot with N.K. at one point, that I don't mind having the programed text in a few subjects, but I think it would get rather boring if you had it in every subject. Of course, the one thing that I – It's much more interesting and much more fun than having a teacher give you an assignment and go over it, and telling you to do this, instead of going right ahead and doing it and finding out the answers, and then you'll be all prepared for the next day, to have a little more – you know, a better discussion on it.

MR. FILEP: Y.N., why was it more fun? Why did you say it was more fun?

Y.N.: Well, it didn't get very monotonous; you just wanted to keep going and find out more about it because you didn't know too much. *(Several words indistinct).*

MR. FILEP: All right, do we have any new participants? All right, we'll go back to the group then. N.S.?

N.S.: Well, I think even if we had the machines two days a week – I mean, not the machines, the – maybe two days a week, and then have a discussion the next day about it, I think we'd be able to go by our own breakdowns(?), because from what I learned today – I mean, I don't think you could possibly be able to achieve what we did in a week, and then if we learn this and then discuss it the next day, we could be sure that we understood it that week and be able to go on much faster.

MR. FILEP: All right. Well, we have a new – *(several words indistinct).*

N.M.: N.M. I was with the Tigers. In most texts we find that at the end of a chapter they'll ask you questions on what you've covered., but in the machine or programed text they'll ask you a question right after it's told you about it, while it's still fresh in your mind, and you should be able to understand it a little better.

MR. FILEP: So what are you saying, that yes, you would like to –– I mean, have it – ?

N.M.: N.M. It would be more profitable to have the programed textbooks.

MR. FILEP: All right. D.E.?

D.E.: D.E. again. I think that the programed texts would be very helpful in math, because at night the teacher could give you a certain assignment to go up to, and you could go through that assignment and do those, and then if you want to work ahead at night, you could – because you'd know what was coming up in the days to come. And also, during class time, I think that the assignment that was given, the ones you want to discuss you should check off in your booklet, and then go through the next day with the teacher, asking him the questions which you didn't understand in the assignment that you had just gone over, and do the ones you could. In math it would be very helpful, but in subjects like history, when you sit and discuss most of your assignments; and it wouldn't be so helpful in English and grammar – it would be helpful in that too. *(Sounds like a contradiction, but that's what he says.)*

MR. FILEP: All right, D.E., you may be interested to know that most of the programs have been written thus far in mathematics and science and languages and vocabulary, and in spelling. The area that the fewest programs have been written in thus far are in the social sciences, so you have a very, very valid observation. Let's get back to this, just – before we leave D.E. for a moment, and then I'll give you a chance to ask about this. How many of you wanted to raise your hand sometime during the program that you were going through and ask a question, there was something that you wanted more information about? All right, about a third. How many of you wanted, somewhere along the line, to challenge the answer that was provided; you didn't think it was the right answer; that you could've thought of another answer that might've been right? All right, that's about three quarters, at least. All right, well, these are things that D.E.'s question raised, and I was just interested to see what your reaction was; so that, as D.E pointed out, you could ask the next day in class, for instance, or you could ask the teacher if you had a chance at the end of the period. All right, now, let's go back to the school idea, about eight periods of programed instruction material, using the machine or otherwise. All right, young – no, it's not Y.D., but it's N.Y., right? Go Ahead, N.Y.

N.Y.: N. N.Y. again. Well, I think it's very good in math, but I think there should be either every other day, or half the period, you'd work on your programed text, or machines or whatever it is, and half of the teachers just – when we came back from this, we had math, and Mr. Osgood was discussing this with us, and there was some type of question about what's half of eight, and there was a little zero there – I

think that was kind of – well, it makes sense, but nobody would naturally put that until we talked about that, and we discussed it, and it really helped, I thought, and it helped to understand what they were trying to put across, and I think a discussion after you've finished would help a lot.

MR. FILEP: L.L.?

L.L.: L.L. I was wondering whether pre-examining the test before and after was for a comparison of what we do after we take the text, or if it's just –

MR. FILEP: Well, L.L., see, what could've happened, you may have studied numbers and numerals last night, and so why the pre-test was given was to determine how much you knew about numbers and numerals. We're assuming that most of you didn't know anything, but someone may have studied it last night, so that when we gave you the post-test there was no way of really learning how much you had gained from the program, unless we gave you the pre-test. So say you got them all right in the pre-test, this would show us that you should get them all right in the post-test. But supposing in the pre-test you didn't get any right, but you got three quarters of them right in the post-test? That showed you learned something from the program, right? And that's why we had the pre- and the post-test. All right, Miss Y.T.?

Y.T.: Well, this goes way back to what Y.N. said. She said that today it didn't seem monotonous. This is the first day we've done it, and if we did it eight periods every day and five days a week, it'd get boring. But this is the first time we've done it, so it didn't seem boring – not too much, but maybe if you could do it every other day or half a period or something like that, it wouldn't be too bad.

MR. FILEP: Miss Y.X.?

Y.X.: Y.X. And I think that – I agree that it would get boring after a while. I agree with Y.T. that today is exciting, because it's the first time we've had it, and that – *(several words indistinct)* – that it shouldn't be every day in each subject.

MR. SIMPSON: You people that have used the programed texts, do you feel that that was as exciting as using the machines?

MR. FILEP: N.M., go ahead.

N.M.: Those of us who used the machines have never used the programed texts.

MR. FILEP: It's a little hard to draw a comparison then. All right, well, look, some of you are saying yes, this would be nice, let's use it at school, but we don't want to have it all the time, let's use it maybe two or three periods a day. Where would you see it being used, or how would you like to have programmed instruction materials? All right, go ahead.

D.N.: I'm D.N., and I think that with the programed texts it would be impossible to have it for the working part of industial arts and art, because in art and industrial arts you learn by making mistakes and using your hands. So therefore, it wouldn't do any good, but in the other subjects I think you could go along quite rapidly and learn equally as much, if not more.

MR. FILEP: All right, L.L.?

L.L.: L.L. Well, I don't see how – I think it's quite impossible to be done eight periods a day. I don't see anybody around that –

MR. FILEP: I'd agree with you, L.L. Go ahead. I'm just interested in how – I mean, or where do you see it being used? Or how would you like to have it used? All right, go ahead.

L.S.: L.S. I'd like to see it being used more in math – *(remainder of her short comment is inaudible.)*

MR. FILEP: Okay, now we go around the circle – *(several words indistinct).*

L.S.: I'm impressed with one thing. It wouldn't be effective with, say, history, because you need longer and more detailed answers, and could you learn by – could you write a longer and more detailed and full answer on the program?

MR. FILEP: There are some programs that are developed, and students are using – they're being tested now – where you write longer answers. Some of them you write an essay; where, when you come to the end of the program, you have five or six ideas that you want to bring back to class the next day and ask your teacher about. So this is a good possibility. All right, Mr. N.N.?

N.N.: N.N., of the Bears. One or two questions about the system: for one, on the pre-test, I don't think is really too good a test, except in the last part of it, because on true and false someone could get quite a lot of them right just by guessing, and then you say, well – oh, he knows it, but then he might get about the same mark in the end, because he knew it then, he wasn't guessing then. So I don't think they should have true and false. And also, on the grouping, I don't see why they just didn't take – well, get one group of kids and have them do all three tests, in – you know, similiar – you don't have to do it the same way, but all three similar, not exactly the same things. I think that'd work just about as good,

because did they know it more on the third or the first one, and the groups can't possibly be evenly matched, so – *(several words indistinct).*

MR. FILEP: N.N., if you were to start on a similar test tomorrow morning, you'd know a lot more tomorrow morning than you knew when you started this morning –

N.N.: I know. But also, the groups can't be evenly matched. *(Several words indistinct).*

MR. FILEP: Or consolidate two in one section – or consolidate one in one section –

N.N.: I know, but it can't really be evenly matched, really. *(Several words indistinct).*

MR. FILEP: All right, well, some of you seem to have some reactions to what – to this last statement. All right, go ahead.

N.Y.: Well, I think the people who *(several words indistinct)* – made very sure, in about every possible way they could, that the people – *(several words indistinct. This little girl is stumbling along almost incoherently, and it's impossible to follow her words or her reasoning.)* – they took them – all the tests we've had – and everything – *(several words indistinct)* – but – and also, I question the ability of this in language. Do they have anything for foreign languages? Well, I question the effectiveness of this, because in foreign languages your grammar and everything could be learned maybe, but I think you really need quite a bit of a teacher, more than almost any other subject – maybe with history, too – but you need a teacher an awful lot, and I don't think it would be as good for that.

MR. FILEP: You may be interested to know, N.Y., because this is learning as well as your telling me about what your experience this morning . There's a program now that we've just finished testing in beginning French. It covers the entire year of beginning French. But it's not only in written form; the students have a tape where they're hearing a person speak in French, and then in front of them is a little picture projected on the screen, so if they're talking about something – are any of you involved in French at this point?

CHORUS OF VOICES: All of us.

MR. FILEP: All of you, All right, well, you see a little picture, and you have la boite sur la table and then you have a picture la boite sur la table or sous la table. Right? Are you that far along just? No? Okay, but you have two pictures, one box is on the table and the other is underneath the table; at the same time, you're hearing this pronounced. Then you see a sentence where the boite is left out, or it just has the B, and this is like you had an S for some of these things this morning – well, the B is there – and then you have la b----sur la table, and these are things that you work with. And so, actually, languages have lent themselves very nicely to this type of instruction. And maybe next year – who knows? – you may be doing something with this, and it's lots of fun. But let's get back to the question that was raised before, the question over here about – all right, Miss E.S., you wanted to respond? Go ahead.

E.S.: Yes. Well, we were speaking about which classes in which these learning machines or programed texts would be best. I think that mathematics and sciences and spelling and grammar would probably be best. These are all my particular weaknesses, and I can't find anything quite exciting about any of them. History and languages are different, not only because more extensive programed texts, with recording, with screen, for practically every student, would have to be provided, and plus the fact that practically everyone's pronunciation is different in all languages, and in history many times the teacher has ideas which he wants to convey to the student which cannot be conveyed through a machine or programed text. And also, in the machines, I found something else that was rather irritating was the large sheet of answers that were too long to be included, and this was rather confusing. You'd write an answer and you'd pull the slot and it would say, see Section AX. So you'd look down the sheet and try to find Section AX. By the time you'd gotten there, you were pretty much bored with the whole thing, and ready to move on to the next question, and the answers really didn't seem worth to read or know, anyway.

MR. FILEP: So it didn't move fast enough for you?

E.S.: Not really. I think if you're going to have a learning machine, you might as well have it big enough to have all the answers included on it.

MR. FILEP: Well, this just happened to be a limitation of the particular machine you were using today. Go ahead.

N.K. (?): N.K. (?). I was a Tiger and worked with machines. I believe this course can be used for Math and English, because they're courses which – they don't particularly need discussion in class, and you can work along by yourself very well, except – *(several words indistinct)* – or a good teacher. But that would eliminate the whole class having to wait for one person, or one or two people. But I do think that it couldn't be used in such subjects as history or languages at times, because we miss certain discussions, certain little facts the teachers want to put it or –I know Mr. Grant (?), he reads some things from other books, in his history course, that we normally wouldn't get, and he also has posters and

certain things from, say, World War I, which we're studying now, that through the machine we probably wouldn't see

MR. FILEP: D.E.?

D.E.: D.E. I'd like to get back to that monotonous business that was raised. I don't actually think it would get that monotonous, because – like, when you read a book, you want to find out what's over on the next page, it gets interesting and I think to most students it would be a challenge, turning over the page in order to deal with – well, more advanced problems. I think it would be a challenge to continue in the books. But I don't think it would get that monotonous, because you're going to be learning new material every day.

MR. FILEP: All right, so you feel that for a fair part of your week, D.E., you would like to use this, then?

D.E.: Yes.

MR. FILEP: All right, Y.Y.?

Y.Y.: Y.Y., an Indian. I think if this is going to be used extensively in the schools, I think for, let's say, subjects like mathematics, we could use maybe – or go through part of a programed textbook one day and then have an assignment that was sort of along the same line as the programed text where we'd have the same sort of problems. Then when we got back to school the next day, we could discuss those, and sort of dig right down to ––

MR. FILEP: All right, so Y.Y., you're raising the question, how about using this for homework and for out-of-school assignments. I mean, all that teaching machine would be kind of heavy to take home. But how about the programed text?

Y.Y.: I mean the programed texts and everything. And on that, I think we could have a different textbook that we could just have some problems to do and not have the answers right then, but then we could discuss them and see how we got the answers – *(several words indistinct)*.

MR. FILEP: All right, the young lady here, Y.R.

Y.R.: Y.R. I think doing them for homework would be a good idea, and then having discussion in classes and stuff, because if you took them home, that way your teachers aren't around to give you the – – you know, help you along with it, and then you could do that at home, and then talk about it in school and do other things in school where they could – you know, teach you – *(several words indistinct)*.

Y.F.: Y.F. I don't think they should have it for homework because – I mean, say like – *(several words indistinct)* – a person could just turn a page and see the end, you sit right down and look over the list, but you wouldn't know why you got it – *(several words indistinct)*.

MR. FILEP: Y.F., didn't you have the chance to do that today when you were working with it, to turn over the page and look at it?

Y.F.: *(Indistinct)*.

MR. FILEP: The young lady with the –

N.R.: I'm N.R. I was a Bear. And I agree with Y.R. I think we should be able to take the booklets home so we can do them at home, and then if there's any question in class the next day, we could get it straight in our minds with the teacher.

MR. SIMPSON: Do you suppose, Y.R., if you took this booklet home, that your mother and dad would be happy to take a look at it, and would get so intrigued by it that you wouldn't be able to look at it yourself? Do you think they'd be that interested in it?

Y.R.: Well, yes.

MR. FILEP: There's a possibility there, also.

L.L.: L.L. I don't like the idea of being – *(several words indistinct)* stuck regularly in programed texts for eight periods a day, or just a few periods a day, because – especially in the sciences, if you – certain things – a statement will be made in a book or text, and you want to ask about it, and you start wondering about it, and you ask your teacher and he can solve your problems. And also, it would be kind of dull to look forward every day to just being fed plain basic facts, instead of having a teacher liven up your class like Mr. Grant(?). *(Laughter)*

MR. FILEP: All right, well, L.L., let me, just for clarification, say that there are – this is a very basic program that you worked with, and there are some that have been written in perhaps a very definite elements of humor, they even include cartoons in them, and they're pretty exciting to work with. I'm not arguing your point, but just pointing out – illustrating that there are some things in this area. Running on time, are we?

MR. SIMPSON: Yes, fine. This is over in about two minutes, I think.

MR. FILEP: All right, quick. Well, we'll give you – just fire away – all right, Y.D. you have thirty seconds, go ahead, say what you want to say.

Y.D.: Well, or – *(laughter)* – Well, I think we should use the texts and we should have them at home, or use the texts in school and then have others having to do with them at home, because I think it would be much more interesting if we used the texts in school and then have something to do with the text at home, as another book that we're using outside.

MR. FILEP: Okay, all right, very good. Let's see, Y.N., you had a question.

Y.N.: Y.N., and – *(several words indistinct)*. And I think we should use the programed texts in school and then have sort of – *(the bell rings)* – not really a text – *(several words obscured by ringing of the bell)* – *(remainder of her words indistinct)*.

MR. FILEP: All right, One last comment. Go ahead.

UNIDENTIFIED BOY OR GIRL: Well, I don't think we should take the textbooks home – *(remainder of her words indistinct.)*

MR. FILEP: Instead of helping you, they're going to do more of the work themselves?

UNIDENTIFIED BOY OR GIRL: Yes.

MR. FILEP: All right, Miss Y.X., one more. Go ahead.

Y.X.: Y.X. And I feel they may be interested in it, but I don't think they'll be that interested. They want you to get your work done.

MR. FILEP: All right, let me just throw one more quick one – *(several words indistinct)*. Did you find yourself, when you got an answer – where you saw an answer to a particular question, were you willing to accept it, or were you willing to ask yourself whether this was the right answer? Did it make you think about it when you saw that answer? All right, N.M. – no, it's E.L. – ?

E.L.: E. E.L. I think that some of them they give you an answer to something and you aren't quite sure of it and you just have to accept it, and there are some that you'd like to question.

MR. FILEP: All right, where would be the place you'd question it if you had a chance?

E.L.: Well, there was one er –

MR. FILEP: No, I mean where would you bring the question in if you had a question? Back to your teachers?

E.L.: Yeah.

MR. FILEP: Yeah: All right, anyone else feel this way? Go ahead.

UNIDENTIFIED BOY: Well, I don't question the answer, but I think that the way some of the questions were worded was tricky, and in that way you give the answer that you think is right, and the answer may be wrong, because there isn't a standard. As to where I would put the question, I think if – well, if there was a slide in the machines where you put a wrong mark, and you might put a little check mark someplace, and then after the tapes have been taken out of the machines, check with your teacher and have a class discussion.

MR. FILEP: mmmm hmmm, okay. *(Several words indistinct)* – difference – a real significant difference. All right, go ahead.

UNIDENTIFIED BOY OR GIRL: Well, there's only one problem about taking programed texts home and doing homework. It wouldn't really be too fair to take marks on anything you did – I mean, after you've filled in the right answers, put checks beside the ones you got wrong – and not everybody's going to be honest about it. So, I mean, it wouldn't be really fair to take marks – *(remainder of his or her little remark is indistinct.)*,

MR. FILEP: So you think it'd be kind of hard to get grades with whatever you're doing, because everyone would know it, you'd learn it all the time. *(Several children talk at once)*. All right, so maybe everyone would know it – *(Several words indistinct)*. Last one, okay – *(several words indistinct)*.

E.R.: E.R. I was a tiger. Well, you couldn't just look at the answer and write it down; you'd have to have your work there to figure it out with. So you could swap papers, and if the teacher asks you – *(several words indistinct)* – teacher asks him if he has his work there, and show that he really did do his homework. But they don't cheat. *(Several children talk at once.)*

MR. FILEP: Okay, well, I guess you all have to get off to your next class. Thank you very, very much. *(Chatter and Confusion.)*

END